

LESSON 6: MSDS HEALTH HAZARD INFORMATION

TRAINER'S NOTES: Introduction and Learning Objectives

Ask trainees to look at the Introduction and Learning Objectives of page 6-1 of their Student Workbook and emphasize the following:

- **In addition to** physical hazard information, Material Safety Data Sheets contain a great deal of information about health hazards.
- In this lesson, you'll see how you can use the MSDS to **identify** —
 - Health **hazards**;
 - Exposure **routes**;
 - Health **effects**;
 - First-aid procedure
 - Required protective **equipment**; and
 - Special handling and storage precautions.

Note: *As in Lesson 5, you **can provide practice** using **MSDSs** following Videotape Segment 6 by **projecting** or handing one out and asking the following questions:*

- Is it a health hazard?
- What is the exposure limit?
- How can I be exposed?
- What can it do to me?
- What **first-aid** procedures should I use?
- What protective equipment is required?
- What special precautions should I take?

LESSON 6: MSDS HEALTH HAZARD INFORMATION

INTRODUCTION

In addition to physical hazard information, Material Safety Data Sheets contain a great deal of information about health hazards. In this lesson, you'll see how you **can** use the MSDS to **identify** the following

- Health hazards
- Exposure routes
- Health effects
- First-aid procedures
- Required protective equipment
- Special handling and storage precautions

LEARNING OBJECTIVES

When you have completed this lesson, you should be able to do the following

Describe **different** types of exposure limits.

Use health hazard data on **an** MSDS to answer the following questions about a chemical **material**:

Is it a health hazard?

What is the exposure limit?

How can I be exposed?

What can it do to me?

What first-aid procedures should I use?

What protective equipment is required?

What special precautions should I take?

TRAINER'S NOTES: Learning Resources

Videotape Segment 6, located on Tape 2

Note: *On VHS or BETA videotapes, all seven segments are on one videotape.*

TRAINER'S NOTES: Directions for Proceeding

*Direct trainees to disregard page **6-2** and proceed to page **6-3** of the Student Workbook.*

LEARNING RESOURCES

- Videotape Segment 6: Health Hazard Information
- Workbook Application Exercise 6-1: Understanding MSDS Health Hazard Information
- Workbook Application Exercise 6-2: Using MSDS Health Hazard Information
- Lesson Summary

DIRECTIONS FOR PROCEEDING

Complete the following steps in order. You might want to check off each step as you complete it.

- 1) Read the workbook introduction to Videotape Segment 6.
- 2) Watch Videotape Segment 6.
- 3) Complete Application Exercise 6-1 in this workbook.
- 4) Complete Application Exercise 6-2 in this workbook.
- 5) Read the lesson summary.

TRAINER'S NOTES: Introduction to Videotape Segment 6

Note: *Ask trainees to look at the videotape introduction on page 6-3 of the Student Workbook.*

■ As we watch this videotape, learn how to use the MSDS to —

- identify different types of health hazards;
- find out about exposure limits;
- recognize exposure symptoms;
- help a coworker in a medical emergency; and
- help control health hazards.

INTRODUCTION TO VIDEOTAPE SEGMENT 6: MSDS Health Hazard Information

As you watch this videotape segment, **first** watch for the description of exposure limits. Then notice how you can use the MSDS to recognize carcinogens, exposure routes, and medical symptoms. Also pay close attention to the importance of knowing and using the correct first-aid procedures in a medical emergency. Finally, learn how the MSDS helps protect you from health hazards by specifying particular types of protective equipment required and special handling and storage precautions.

Now, watch Videotape Segment 6.

TRAINER’S NOTES: Application Exercise 6-1

Ask trainees to turn to page **6-5** of their *Student Workbook*. Either lead the class through *Application Exercise 6-1* as a **group activity**, or **provide** time for students to complete the exercise individually or in small groups. The answers and additional information given below appear on pages 6-6 and 8 of the *Student Workbook*.

Answer	Additional Information
1) A, B, D	<p>Exposure limits define the amount of chemical allowed in a given volume of air. Limits are set to define airborne levels that produce no ill health effects in most people, even if they are exposed every day for their entire working lives.</p> <p>If an exposure limit has been set, it means that the chemical is a health hazard. It also means that the chemical can become airborne, and that breathing too much of it can injure you or make you sick.</p> <p>Many chemicals — not just carcinogens — have exposure limits. Often, you cannot see or smell an airborne hazard even when it is present above its exposure limit.</p>
2) C	<p><i>OSHA sets Permissible Exposure Limits</i>, or PELs. Compliance with PELs is mandatory.</p> <p>Compliance with other exposure limits is voluntary.</p> <ul style="list-style-type: none">• ACGIH (American Conference of Governmental Industrial Hygienists) recommends <i>Threshold Limit Values</i>, or TLVs.• NIOSH (National Institute of Occupational Safety and Health) proposes <i>Recommended Exposure Limits</i>, or RELs.• ANSI (American National Standards Institute) recommends limits set by a consensus of experts.• Chemical manufacturers may recommend their own exposure limits.

APPLICATION EXERCISE 6-1: Understanding MSDS Health Hazard Information

Directions: Check or circle your answer(s) to each question, or write your answer in the blank provided. Remember, there maybe more than one correct choice for a question. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.

1) Which question(s) can be answered by looking at exposure limits on an MSDS?

- A) Is the material a health hazard?
- B) Is breathing the material hazardous?
- C) Is the material a carcinogen?
- D) How much can be airborne?
- E) Can I see or smell it?

2) Which type of exposure limits are set by OSHA?

- A) TLVs
- B) RELs
- C) PELs
- D) ANSI limits

Answer Additional Information

3) A, B, C, D Health effects and first-aid procedures vary with the exposure route. Thus, **MSDSs** must identify known health effects and recommended first-aid procedures for each-exposure route that may be hazardous.

MSDSs must **identify** both immediate and delayed health effects. Immediate health effects appear right away, whereas delayed effects develop slowly over time. Exposure limits are set for airborne hazards, not for specific exposure routes.

4) A **MSDSs** must **specify** the **specific** type of gloves or protective eyewear required. For example, impervious gloves and full-face protection are required for working safely with strong acids. The MSDS cannot simply say that gloves and eye protection are required.

Note: *Point out that **MSDSs** may not be specific enough — e.g., may **specify** impervious **gloves** but not the length or cuff type required for trainee's specific **operation**.*

*Emphasize the importance of using the exact **type** of PPE specified for the job.*

Note: *Direct trainees either @proceed to Application **Exercise** 6-2 when finished, or to wait for **further** instructions. If time allows, ask the Optional Questions that begin on page 6-12 of this **guide**.*

- 3) What must the MSDS tell you for ***EACH*** exposure route?
- A) Exposure limits
 - B) Immediate health effects
 - C) Delayed health effects
 - D) First-aid procedures
- 4) If required, does the MSDS have to tell you the specific type of protective gloves and eyewear that you need?
- A) Yes
 - B) No
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*Now go back to page 6-5, fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each **question**. If you are taking this course as a **self-study**, continue to the Application **Exercise 6-2**, "Using MSDS Health Hazard Information," when you have finished. If you are taking this course in a classroom situation, wait for **further** instructions **from** your trainer when finished.*

TRAINER'S OPTIONAL QUESTIONS: Application Exercise 6-1

0 1) Must MSDSS identify carcinogens?

Answer: Yes

The MSDS must identify carcinogens —

- regulated by OSHA;
- listed in the annual report published by the National Toxicology Program (NTP); and
- . identified by the International Agency for Research on Cancer (IARC).

0 2) Must the MSDS identify medical conditions that can be made worse by exposure to a chemical?

Answer: Yes

MSDSS must identify any medical conditions that may become worse when a person is exposed to the material,

Someone who has a medical condition that is listed on an MSDS should consult a doctor to find out whether it is safe to work with the material.

0 3) What information do you need to identify the correct first-aid procedure?

Answer: Chemical identity, exposure route, worker's condition

Correct first-aid procedures depend on the *IDENTITY OF THE CHEMICAL*, the *EXPOSURE ROUTE*, and the *PERSONS CONDITION*.

For example, ingestion of one chemical may require drinking plenty of water while ingestion of another requires someone to induce vomiting. Inhalation of both these chemicals may require moving conscious victims to fresh air and getting immediate medical attention for unconscious victims.

Using the correct first-aid procedure is vital because taking the wrong action can have serious medical consequences.

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STUDENT WORKBOOK: No Reference

- 0 4) *Point out that MSDSS cannot leave blank spaces and ask: Does a “Yes” satisfy OSHA’s requirement for identifying the need for respiratory PPE?*

Answer: No

If respiratory protection is *NOT* normally required, the MSDS should say so. MSDSS should not contain blank spaces. Often, the abbreviation NA is used to indicate Not Applicable — which means the protection is not required.

If respiratory protection IS required, the MSDS must **specify** the **specific** type needed — such as an air-purifying respirator that removes organic vapors. The MSDS cannot simply state “Yes” or “Required.”

- 0 5) Does the MSDS have to **specify** the specific type of local or general ventilation system required?

Answer: No

The MSDS must **identify** the category of ventilation required — local exhaust, general, or some special category.

However, there are numerous **different** types of ventilation systems within each of these basic categories. Often, selection of the appropriate **specific** type depends more on the operation or work environment than on the chemical. Thus, it would be impractical for MSDSS to **specify** the **specific** type of ventilation system required within each category.

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STUDENT WORKBOOK: No Reference

TRAINER'S NOTES: Application Exercise 6-2

*Ask trainees to turn to page 6-9 of their Student Workbook. Either lead the **class** through Application **Exercise 6-2** as a group activity, or **provide** time for students to complete the **exercise** individually or in small groups. The answers and additional information given below appear on pages 6-10 and 6-12 of the Student Workbook.*

Do one of the following:

- Refer trainees to the MSDS for Caustic Soda Beads in Appendix A (pages A-6 to A-7) of their workbook and ask each question.*
 - Tailor the activity to your **facility** by handing out or projecting MSDSs for several commonly used chemical materials in your **facility** and asking questions similar to questions 1 through 3.*
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Answer	Additional Information
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	The MSDS for Caustic Soda Beads is located on pages A-6 to A-7 of Appendix A.
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1) B	
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	The Health Hazard Data Section, Section VI, clearly identifies this material as a corrosive. It destroys body tissues upon contact, and it can cause serious burns, permanent blindness, or death upon ingestion. Although the effect of exposure can be only mild irritation, this material is not classified as an irritant. Irritants are capable of causing only minor health effects, not life-threatening or disabling burns.
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	Section VI also tells you that neither the NTP, IARC, nor OSHA considers this material either a carcinogen or potential carcinogen. The MSDS does not identify any effects associated with entry into the bloodstream. This corrosive is a contact hazard, not a target organ chemical, reproductive hazard, or sensitizer.
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	The FIRST-AID PROCEDURES given in the Health Hazard Data Section give specific instructions for each exposure route. For ingestion, the MSDS recommends giving large amounts of water — provided that the victim is conscious. This is the correct procedure for ingestion of most corrosives. You should NOT try to make the victim throw up because the corrosive would burn as it came back up.
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	For inhalation, the correct procedure is either to get the victim to fresh air (breathing) or to give artificial respiration (not breathing). Skin or eye contact calls for “flushing” the exposed area with water, which means running water over it for at least 15 minutes.
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APPLICATION EXERCISE 6-2: Using Health Hazard Data on MSDSs

*Directions: Check or circle your answer(s) to each question, or write your answer in the **blank** provided. Remember, there may be **more** than one correct choice for a question. When you complete the **exercise**, fold over the right side of the page to check your answers. Then turn the page to get **more** information about each question.*

Locate the MSDS for Caustic Soda Beads in Appendix A and use this MSDS to answer the following questions.

1) What type of health hazard(s) does this material present?

- A) Irritant
- B) Corrosive
- c) Target organ chemical
- D) Reproductive hazard
- E) Sensitizer
- F) Carcinogen

2) What should you do if a co-worker accidentally swallows some of this chemical?

- A) Try to make the person throw up
- B) Get the victim to fresh air
- c) Make the person drink a lot of water
- D) Begin artificial respiration

Answer	Additional Information
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3) B C D	Generally required protective equipment is identified in the Control Measures Section. This includes a respirator with a high efficiency filter to remove any corrosive-mists or vapors. Rubber gloves, apron and chemical splash-proof goggles are also recommended.
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Note: *Direct trainees either **to proceed** to the Lesson **Summary** when finished, or to wait for **further** instructions. If time allows, ask the Optional Questions that **begin** on page 6-20 of this guide.*

3) What type(s) of special protection might be required to work safely with solutions of this material?

- A) Air-supplied respirator
- B) **Air-purifying** respirator
- c) Chemical splash-proof goggles
- D) Rubber gloves
- E) Full-body protective clothing

*Now go back to page 6-9, fold over the right side of the page, and check your answers. Look on the back of the question page for **more** information on each question. **If you** are taking this course as a **self-study**, proceed to the Lesson **Summary** when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.*

TRAINER'S OPTIONAL QUESTIONS: Application Exercise 6-2

Do one of the following:

- *Refer trainees to the MSDS for Steel Alloys in Appendix A (pages A-16 to A-17) of their workbook and ask each question.*
 - *Tailor the activity to your facility by handing out or projecting MSDSS for several commonly used chemical materials in your facility and asking questions analogous to questions 01 through 07.*
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01) Can steel alloys present a health hazard?

Answer: Yes

Look at the Health Hazard Data in Section VI.

Bulk steel is not a health hazard, but exposure to steel alloy dusts or fumes can cause both immediate (or acute) and delayed (or chronic, long-term) health effects.

02) Which exposure route or routes are hazardous?

Answer: Breathing/Inhalation, Ingestion

Look at the Health Hazard Data in Section VI of the MSDS. It says that inhaling metal alloy fumes may cause chink and fever. It also says that the material can enter the body through breathing (inhalation).

Ingestion of metallic dusts can also be hazardous because the metals tend to accumulate in the body.

STUDENT WORKBOOK: No Reference

03) *BYLAW*, what is the exposure limit for iron oxide fumes?

Answer: 10 mg/m³

Look at the exposure limits included in the Hazardous Ingredients Information given in Section II.

OSHA PELs are the only exposure limits set by law, The PEL for iron oxide fumes (a hazardous decomposition product of the iron component) is 10 mg/m³. Compliance with exposure limits recommended by the ACGIH is voluntary.

04) Can exposure to steel alloy fumes cause cancer?

Answer: Yes

The Health Hazard Data Section says that two metals in the steel alloy can cause cancer. Both nickel and chromium are listed as carcinogens by the National Toxicology Program (NTP) and the International Agency for Research on Cancer.

The additional health hazard information contained in the MSDS says that exposure to either nickel or chromium fumes can cause cancer of the nasal passages and lungs.

05) What exposure symptom(s) can develop slowly over time?

Answer: Lung, kidney, and muscle damage

The Health Hazard Data in Section V of the MSDS says that the chill and fever associated with "metal fume fever" disappear within 48 hours following exposure. This is an immediate (or acute) effect.

The additional notes on delayed health effects in the Special Precautions Section say that chromium, manganese, and nickel fumes can cause *LUNG DISEASE*. Exposure to lead fumes can *DAMAGE THE KIDNEYS* and *AFFECT MUSCLE STRENGTH*.

06) *List* choices *and ask*: Which medical condition might be made worse by exposure to steel alloy dusts or **fumes**?

- A) Low blood pressure
- B) Stomach ulcer
- c) Near-sightedness
- D) Asthma

Answer: D; Asthma

The Health Hazard Data Section says that chronic lung disease can be aggravated by exposure to steel alloy fumes or dusts. Asthma maybe considered to be a chronic lung disease.

() '7) What type of protective equipment maybe required for welding or grinding operations?

Answer: Dust/free respirator, local exhaust ventilation

Look at the information given in Section VIII of the **MSDS**. It specifies use of a ***DUST/FUME RESPIRATOR*** and ***LOCAL EXHAUST VENTILATION*** for particulate to remove airborne hazards in weMing **and** grinding operations.

General exhaust ventilation is not suitable for removing metal dusts or fumes because the particulate are too heavy.

STUDENT WORKBOOK: No Reference

*If time permits, review and **reinforce** the learning objectives by asking the questions suggested below. Draw trainee's attention to the tables in the **Summary** of the Student Workbook. Point out that the tables summarize how to **read** and use the sections of the MSDS covering health hazard information.*

Note: Make sure that you actually **provide practice** using **MSDSs**.

Q1) Which sections of the MSDS contain **specific** information about health hazards?

Answer: Three sections of the MSDS contain **specific** information about health hazards.

- . Hazardous Ingredients Section
- Health Hazard Data Section
- . Control Measures Section

Q2) *If time permits, **provide practice** using the tables on pages 6-13 and 6-14 of the Student Workbook by asking questions such as the following:*

- What information **tells you how much** of the material can be present in the air you breathe without causing adverse health effects in the average person exposed to that level over a working lifetime?

Answer: Exposure limits

- What does the MSDS tell you about exposure hazards?

Answer: How you can be exposed and what health effects may result

LESSON 6 SUMMARY

Three sections of the MSDS contain **specific** information about health hazards.

- . Hazardous Ingredients Section
- Health Hazard Data Section
- Control Measures Section

The following table **summarizes** the information you will **find** in the **Hazardous Ingredients Section**.

Data	Question Answered	Explanation
EXPOSURE LIMITS	Is it a health hazard? Is breathing it harmful? How much can be in the air, without causing adverse health effects in exposed individuals?	YES if a limit is given. YES if a limit is given. Limit gives parts of contaminant per million parts of contaminated air (ppm) or milligrams (mg) per cubic meter ; PELs (Permissible Exposure Limits) are mandatory.

The following table **summarizes** the information you will **find** in the **Health Hazard Data Section**.

Data	Question Answered	Explanation
EXPOSURE HAZARDS	How can I be exposed? What can it do to me?	If any are known, MSDS must give both immediate and delayed health effects for each exposure route .
FIRST-AID PROCEDURES	What first-aid procedure should I use?	Follow the recommended procedure given for the person's exposure routes and current condition.

- What questions does the MSDS answer about required controls for inhalation hazards?

Answer: Need for ventilation and/or respiratory PPE and specific type(s) required

The following table summarizes the information you will find in the **Control Measures Section**.

Data	Question Answered	Explanation
RESPIRATORY PROTECTION	Do I need respiratory PPE? What type do I need?	YES if any type listed. Air-supplied or specific type of air-purifying should be given.
VENTILATION	Is ventilation required? Is local exhaust needed? Is general needed? Is a special type needed?	YES if any identified. YES if section identifies. YES if section identifies. YES if section identifies.
PROTECTIVE GLOVES	Do I need gloves? What type do I need?	YES if any identified. MSDS must state type.
EYE PROTECTION	What type of eye protection do I need?	MSDS must state specific type needed.
OTHER PROTECTIVE EQUIPMENT	What other protective equipment is required?	Any listed.